



### Product highlights

- Safe detection of liquids, bulk solids and powders
- Short immersion length
- Capable of differentiation between foam and liquid
- Insensitive to adherent or sticky media
- Status indication by bright, multicolor LED
- Compact stainless steel housing, protection up to IP69K
- Teach-in on site or by remote control wire
- Two switching outputs with dedicated switching windows

### User benefits

- One sensor for all applications
- Safe process with less downtime
- Visual observation of process
- High acceptance of process connections
- Easy to operate

### Technical data

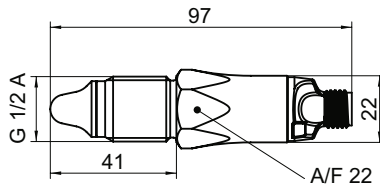
<b>Housing</b>		<b>Power supply</b>	
Style	■ Compact design	Reverse polarity protection	■ Yes
Overall size	■ Refer to section „Dimensional drawings“	Power-up time	■ < 3 s
Material	■ Stainless steel	<b>Output signal</b>	
<b>Electrical connection</b>		Output type	■ PNP ■ NPN ■ Digital (push-pull)
Connector variants	■ M12-A, 4-pin, polycarbonate	Current rating	■ 100 mA max.
<b>Ambient conditions</b>		Short circuit protection	■ Yes
Operating temperature range	■ -40 ... 85 °C	Voltage drop	■ PNP: (+Vs -0.5 V) ± 0.2 V, Rload ≥ 10 kΩ ■ NPN: (+0.4 V) ± 0.2 V, Rload ≥ 10 kΩ
Storage temperature range	■ -40 ... 85 °C	Off leak current	■ < 100 µA max.
Humidity	■ < 98 % RH, condensing	Switching logic	■ Normally open (NO) ■ Normally closed (NC) ■ Active high ■ Active low
Degree of protection (EN 60529)	■ IP67 ■ IP69K (with appropriate cable)	<b>Performance characteristics</b>	
Vibration (sinusoidal) (EN 60068-2-6)	■ 1.6 mm p-p (2 ... 25 Hz), 4 g (25 ... 100 Hz), 1 octave / min.	Repeatability	■ ± 1 mm
<b>Process connection</b>		Hysteresis	■ ± 1 mm
Connection variants	■ Refer to section „Dimensional drawings“	Response time	■ 0.02 s typ.
Mounting position	■ Any (top, bottom, side)	Media characteristics	■ DK > 1.5
Wetted parts material	■ PEEK Natura ■ AISI 316L (1.4404)	Damping	■ 0.0 ... 10.0 s (adjustable)
Surface roughness wetted parts	■ Ra < 0.8 µm	<b>Factory settings</b>	
<b>Process conditions</b>		Switching range (dielectric constant DC)	■ < 75 % (DC > 2)
Process temperature	■ Refer to section „Process conditions“	Damping	■ 0.1 s
Process pressure	■ Refer to section „Process conditions“	<b>Compliance and approvals</b>	
<b>Power supply</b>		EMC Immunity	■ EN 61326
Voltage supply range	■ 8 ... 36 V DC	EMC Emission	■ EN 61326 (installed in a metal tank)
Current consumption (no load)	■ 25 mA typ., 50 mA max.	Hygiene	■ FDA (21 CFR 177.2416)

**Note:**

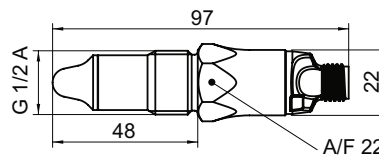
Information on product characteristics may relate to defined product options.

**Process conditions**

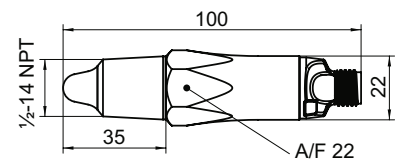
Process connection	BCID	Ordering key	Process temperature continuous Tamb < 50 °C °C	Process pressure bar	Process temperature max. temporary t < 1 h Tamb < 50 °C °C	Process pressure @ Process temperature max. temporary bar
G 1/2 A ISO 228-1	G07	G070	-40 ... 115	-1 ... 100	135	-1 ... 100
G 1/2 A hygienic	A03	A030	-20 ... 115	-1 ... 10	135	-1 ... 5
1/2-14 NPT	N02	N020	-40 ... 115	-1 ... 100	135	-1 ... 100

**Dimensional drawings**
**Process connection**


**G 1/2 A ISO 228-1**  
G07-G070



**G 1/2 A hygienic**  
A03-A030



**1/2-14 NPT**  
N02-N020

**Note:**

Information on product characteristics may relate to defined product options.

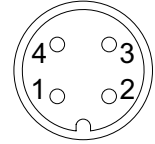
### Field of application

*CleverLevel®* LBF1 is designed for level detection in tanks and dry-run protection of pumps by empty pipe monitoring. It detects liquid, pasty or oily media, but also solid-bulk materials like flour or plastic granulate. The LBF1 is capable of media differentiation by distinguishing the specific properties, such as oil, water, foam and liquid. Reliable performance is assured in any mounting position (from top, bottom or side). Depending on the desired process connection, different mounting options are available. Corresponding mounting aids and adaptors for conventional process connections are available as an accessory. Two switching outputs are available with dedicated switching windows. The switching function is programmable as PNP, NPN or digital (push-pull) polarity, as

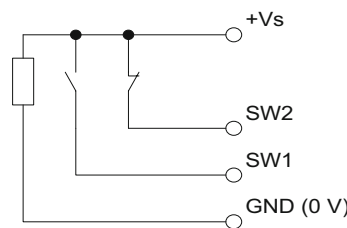
well as the switching logic like Normally Open (NO), Normally Closed (NC) or inverted. *CleverLevel®* LBF1 in its default configuration covers a major part of potential applications. Where customer-specific configuration is required because of demanding media (e. g. foamy or adhering), qTeach, remote teach or the FlexProgrammer 9701 allows for easy optimization of the switching windows. The measured data can be visualized on a PC for further parameter adjustment, for example time constant of a damping function and inverted switching output logic.

### Measuring principle

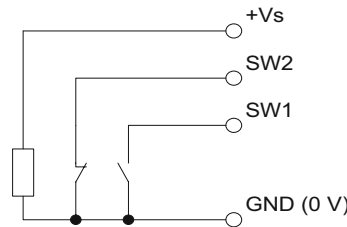
An electrode inside the sensor tip builds a capacitor together with the surroundings. The medium with its dielectric constant (DC value) is defining the capacitance value. A resonance circuit is created in combination with a coil in the sensor head. Switching signal tripping is according to the measured resonance frequency and the programmed trigger thresholds.

**Electrical connection**
**Pin assignment**


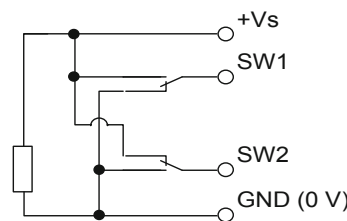
Output type	Equivalent circuit	Function	M12-A, 4-pin, polycarbonate X04-000
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**PNP**


+Vs	+Vs	1
SW1	SW1	4
SW2	SW2	2
GND (0 V)	GND (0 V)	3
	Frame ground	

**NPN**


+Vs	+Vs	1
SW1	SW1	4
SW2	SW2	2
GND (0 V)	GND (0 V)	3
	Frame ground	

**Digital push-pull**


+Vs	+Vs	1
SW1	SW1	4
SW2	SW2	2
GND (0 V)	GND (0 V)	3
	Frame ground	

**Ordering information**

	LBF1	-	X	X	.	XXX	.	XXXX	X	X	.	X	.	X	XX	X	.	X	
<b>Type</b>	LBF1																		
Level switches																			
<b>Version</b>																			
Standard				1															
<b>Housing</b>																			
Standard				1															
<b>Electrical connection (BCID)</b>																			
Connector M12-A, 4-pin, polycarbonate (with LED)						X04													010
Connector M12-A, 4-pin, stainless steel (without LED)						X04													020
<b>Process connection (BCID)</b>																			
G 1/2 A ISO 228-1																			G070
G 1/2 A hygienic																			A030
1/2-14 NPT																			N020
<b>Wetted parts material</b>																			
AISI 316L (1.4404)																			2
<b>Gasket</b>																			
Without																			0
<b>Output type</b>																			
PNP																			1
NPN																			2
<b>Explosion protection</b>																			
Without																			0
<b>Industrial approvals</b>																			
Standard																			00
<b>Special approvals</b>																			
Standard																			0
<b>Configuration</b>																			
Factory settings																			0
Customer-specific																			1

**Accessories**
**Industrial weld-in sleeves for „Process connection“ G070 (G 1/2 A ISO 228-1, BCID: G07)**

Description

Ordering information

**Universal use**

 Ø 30 x 26, AISI 304 (1.4301)  
 Ø 30 x 26, AISI 316L (1.4404)

 ZPW1-711  
 ZPW1-721

**Hygienic weld-in sleeves for „Process connection“ A030 (G 1/2 A hygienic, BCID: A03)**

Description

Ordering information

**Universal use, with leak detection port**


Ø 30 x 34, AISI 316L (1.4404)

ZPW2-321

**Thin-walled tanks**


Ø 45 x 34, AISI 316L (1.4404)

ZPW2-322

**Inclined mounting**


Ø 35 x 34, AISI 316L (1.4404)

ZPW2-324

**Pipes with collar**

 DN 25 ... 50, Ø 29 x 36.5 AISI 316L (1.4404)  
 DN 65 ... 150, Ø 30 x 36.5 AISI 316L (1.4404)

 ZPW2-326  
 ZPW2-327

**Thread adapters for „Process connection“ A030 (G 1/2 A hygienic, BCID: A03)**

Description

Ordering information

**Industry standard**

 G 1 A ISO 228-1, AISI 316L (1.4404)  
 G 1 1/2 A ISO 228-1, AISI 316L (1.4404)  
 G 2 A ISO 228-1, AISI 316L (1.4404)

 ZPH1-32B  
 ZPH1-32D  
 ZPH1-32E

**Vibration fork replacement**

 G 3/4 A EH FTL (GW2), AISI 316L (1.4404)  
 G 1 A EH FTL (GQ2), AISI 316L (1.4404)  
 G 3/4 A VS, AISI 316L (1.4404)  
 G 1 A VS, AISI 316L (1.4404)

 ZPH1-32BA  
 ZPH1-32BC  
 ZPH1-32CB  
 ZPH1-32CD

**Hygienic interfacing**


G 1 A hygienegerecht, AISI 316L (1.4404)

ZPH1-32C0

**Accessories**
**Connectors with stainless steel knurl for demanding applications, protection up to IP69K (M12-A, 4-pin, BCID: X04)**

Description

Ordering information


**Female connector straight with attached cable**

 2 m, TPE  
 5 m, TPE  
 10 m, TPE  
 25 m, TPE

 ESG 34AY0200  
 ESG 34AY0500  
 ESG 34AY1000  
 ESG 34AY2500

**Female connector angular with attached cable**

 2 m, TPE  
 5 m, TPE  
 10 m, TPE  
 25 m, TPE

 ESW 33AY0200  
 ESW 33AY0500  
 ESW 33AY1000  
 ESW 33AY2500

**Industrial connectors, protection up to IP67 (M12-A, 4-pin, BCID: X04)**

Description

Ordering information


**Female connector straight with attached cable**

 2 m, PUR  
 5 m, PUR  
 10 m, PUR

 ESG 34AH0200  
 ESG 34AH0500  
 ESG 34AH1000

**Female connector angular with attached cable**

 2 m, PUR  
 5 m, PUR  
 10 m, PUR  
 15 m, PUR  
 20 m, PUR

 ESW 33AH0200  
 ESW 33AH0500  
 ESW 33AH1000  
 ESW 33AH1500  
 ESW 33AH2000

**Female connector straight with attached cable, shielded**

 2 m, PUR  
 5 m, PUR  
 10 m, PUR

 ESG 34AH0200G  
 ESG 34AH0500G  
 ESG 34AH1000G

**Female connector angular with attached cable, shielded**

 2 m, PUR  
 5 m, PUR  
 10 m, PUR

 ESW 33AH0200G  
 ESW 33AH0500G  
 ESW 33AH1000G

**Female connector straight with screw terminals**

Female connector M12, 4-pol., straight

ES 18A PG7


**Female connector angular with screw terminals**

Female connector M12, 4-pol., angular

ES 14A PG7

**Accessories****Interfaces**

Description

Ordering information

**FlexProgrammer 9701**

Kit for sensor parameterization, including programming interface with USB, connecting cables, carrying strap, CD-ROM with PC software and DTM drivers

9701-0001